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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/078,240 | 02/20/2002 | Shunpei Yamazaki | 740756-2438 | 3255 |

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EXAMINER

LEE, GRANVILL D

| | |
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| ART UNIT | PAPER NUMBER |
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2825

DATE MAILED: 06/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

10/078,240

Applicant(s)

YAMAZAKI ET AL.

Examiner

Granvill D Lee, Jr

Art Unit

2825

-- The MAILING DATE f this communication appears on the cover sheet with the correspondence address --

Peri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5&6. 6) ☐ Other: _____

DETAILED ACTION

Joint Inventors and Common Ownership

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Objections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 14 is objected to under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 14 suggests a raising temperature rate of 30-300 degrees C*/min, while this cannot be the range of the lowering/cooling rate. The range of the cooling rate must be negative or "+/-" for the range indicated.

Regarding claim 1, the phrase (in line 7) "to reduce of distortion formed" is not clear. Correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-13 and 15-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Aya et al. (US Pub.2001/0003659).

In view of these claims (esp. clms. 1 and 9), Aya et al. teaches making a semiconductor device comprising the the steps of forming a crystalline semiconductor (Fig. 1 #3) film by irradiating laser (Abstr.) to an amorphous semiconductor (#2) film; and performing a heat treatment (Para. 0045) to the crystalline semiconductor film to reduce distortion (Para. 0046) formed in the crystalline semiconductor film wherein the distortion is caused by the irradiation of the laser light.

In view of claim 2, Aya et al. includes a laser light on an irradiation surface or in the vicinity of the surface has a rectangular shape (Para. 0048).

In view of claims 3-4 and 10-11, Aya et al. develops a laser selected from gas, solid state or metal laser (Para. 0059-0060).

In view of claims 5 and 12, Aya et al. includes a process, which can go from several seconds (Para. 0096) to many hours (Para. 0092) of heating time.

In view of claims 6 and 13, Aya et al. includes a process, where the temperature is from 700-950 (Para. 0056).

In view of claims 7-8 and 17-18, Aya et al. continues forming an island shape (Para. 0046) crystalline semiconductor film by etching the crystalline film (Para. 0049). This island is formed after the laser treatment (Para. 0049).

In view of claim 15, Aya et al. heats the substrate device from the top of the device (Fig. 7).

In view of claim 16, Aya et al. uses a xenon lamp to heat the sample (Para. 0060).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aya et al. in view of Kinoshita et al. (US Pat. 5,948,496).

In view of this claim, Aya et al. teaches making a semiconductor device comprising the steps of forming a crystalline semiconductor film by irradiating laser to an amorphous semiconductor film; and performing a heat treatment to the crystalline semiconductor film to reduce distortion formed in the crystalline semiconductor film wherein the distortion is caused by the irradiation of the laser light. However, Aya et al. fails to consider the heating or cooling rates to the heating process. But, Kinoshita et al. considers the raising and cooling rates in going from a amorphous to crystalline state (Abstr.) to be about 10 Degrees C/min.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the teachings of Aya et al. with those of Kinoshita et al. with understanding that raising rate to crystallization and cooling rate from crystallization may indeed have an effect on performance (Col. 9 lines 40-60).

Claims 19-39 and 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aya et al. in view of Kinoshita et al. (US Pat. 5,948,496).

In view of these claims (esp. clms. 19, 22, 24, 32, 34 and 44), Aya et al. teaches making a semiconductor device comprising the steps of forming a crystalline semiconductor film by irradiating laser to an amorphous semiconductor film; and performing a heat treatment to the crystalline semiconductor film to reduce distortion formed in the crystalline

semiconductor film wherein the distortion is caused by the irradiation of the laser light. However, Aya et al. fails to apply a second layer of crystalline film by irradiation a laser light to the first crystalline semiconductor film. Yet, in making a laser device Takeya et al. makes a second crystalline layer (claim 2).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the teachings of Aya et al. with those of Takeya et al. to make a layer of high enough thickness to prevent bowing. As invented, Takeya et al. found that a second crystalline layer distributed the thermal properties better resulting in a stronger, stiffer substrate.

In view of claims 20-21, 27-28 and 36-37, Aya et al. develops a laser selected from gas, solid state or metal laser (Para. 0059-0060).

In view of claims 22, 29 and 38 Aya et al. includes a process; which can go from several seconds (Para. 0096) to many hours (Para. 0092) of heating time.

In view of claims 23, 30, 39 and 43 , Aya et al. includes a process, where the temperature is from 700-950 (Para. 0056).

In view of claims 25, 33 and 45, Aya et al. continues forming an island shape (Para. 0046) crystalline semiconductor film by etching the crystalline film (Para. 0049). This island is formed after the laser treatment (Para. 0049-0050). Note that after the second crystalline layer the islands of Aya et al. can still be made.

In view of claim 31, after the Aya et al. first heat treatment a second heat treatment can be added in the context of the Takeya et al. second layer.

In view of claims 35, 42 and 46, Aya et al. uses a xenon lamp to heat the sample (Para. 0060).

In view of claim 41, Aya et al. heats the substrate device from the top of the device (Fig. 7).

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aya et al. in view of Takeya et al. in further view of Kinoshita et al. (US Pat. 5,948,496).

In view of this claim, Aya et al. teaches making a semiconductor device comprising the steps of forming a crystalline semiconductor film by irradiating laser to an amorphous semiconductor film; and performing a heat treatment to the crystalline semiconductor film to reduce distortion formed in the crystalline semiconductor film wherein the distortion is caused by the irradiation of the laser light. Takeya et al. makes a device using a second crystalline layer. But both inventors fail to consider the heating or cooling rates to the heating process. But, Kinoshita et al. considers the raising and cooling rates in going from a amorphous to crystalline state (Abstr.) to be about 10 Degrees C/min.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the teachings of Aya et al. with those of Kinoshita et al. with understanding that raising rate to crystallization and

cooling rate from crystallization may indeed have an effect on performance
(Col. 9 lines 40-60).

Contact Information

Any inquiry concerning this communication or earlier communications for the examiner should be directed to Granvill Lee whose telephone number is (703) 306-5865. The examiner can be normally reached on Monday thru Thursday from 7:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are not successful, the examiner's supervisor, Matthew Smith can be reached on (703) 308-1323. The fax phone number for this group is (703) 308-7722.

Any inquiry of a general nature relating to status or otherwise should be directed to the receptionist whose telephone number is 703-308-1782.

Examiner
Granvill Lee
Art Unit 2825

G1
6/8/03

C. Everhart
CARIDAD EVERHART
PRIMARY EXAMINER